

and separating and isolating the fullerene thus produced therefrom, said fullerene being present in solid form. - -

REMARKS

In accordance with the provisions of 37 C.F.R. §1.129(a), applicants request entry and consideration of a first submission after final rejection.

The present application was filed on June 7, 1995 and is a continuation of U.S.S.N. 07/580,246 filed on September 10, 1990, which is a continuation-in-part of U.S.S.N. 575,254 filed on August 30, 1990.

This is a 37 C.F.R. §1.129(a) submission. This submission is proper in that this application has been pending for at least two years, as of June 8, 1995, taking into account any reference made in such application to any earlier filed application. This submission is being filed during the pendency of the above-identified case, and no Appeal Brief has been filed in this application. Further, this is the first '129 submission in this case. Finally, the requisite fee under 37 C.F.R. §1.17(r) is accompanying this submission.

This submission is being filed to address the issues raised in the Final Action.

The Office Action has rejected Claims 94 and 95 under 35 U.S.C. §102(b) as allegedly defining subject matter which is anticipated by U.S. Patent No. 4,321,334 to Chatterjee ("Chatterjee"). In addition, Claims 89-103 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting over Claims 45-77 and 79-180 of copending application U.S.S.N. 07/580,246. Moreover, Claims 89, 93 and 97 are rejected under 35 U.S.C. §112, first paragraph, as allegedly containing subject matter which is not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that applicants were in possession of the claimed invention at the time the

application was filed. Claims 97, 99 and 100 are rejected under 35 U.S.C. §112, second paragraph for allegedly failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention. Claim 88, 90-92 and 94-103 are rejected under 35 U.S.C. §102(b) or, in the alternative under 35 U.S.C. §103(a) as defining subject matter which is allegedly anticipated by, or in the alternative rendered obvious by, the teachings in the article by Kroto, et al. in Nature 1985, 318, 162-163 ("Kroto, et al.") in view of an article by Curl, et al., in Scientific American, 1991, 54 ("Curl, et al."). Claims 88-103 are rejected under 35 U.S.C. §102(b) as defining subject matter which is allegedly anticipated by Kratschmer, et al. in Surface Science, 1985, 156, 814-821 ("Kratschmer, et al. I"). Finally, Claims 88-103 are rejected by an article by Kratschmer, et al. in Chemical Physics Letter, 1990, 170, 167-170 ("Kratschmer, et al. II").

Applicants have amended the claims and are submitting a third Declaration of Kroto ("Kroto III"), two Declaration of Dr. Donald Huffman ("Huffman Declarations"), two Declarations of Dr. Kratschmer ("Kratschmer "I" and "II" Declarations) and a Declaration by Dr. Raouf Loutfy ("Loutfy Declaration"), which, when considered with the comments hereinbelow, are deemed to place the present case in condition for allowance. Favorable action is respectfully requested.

Claim 94 has been cancelled without prejudice. Applicants have not abandoned the subject matter therein and reserve the right to file a continuation application directed thereto. Claims 95 and 96, which were originally dependent thereon, has accordingly been amended to correct the dependencies. Claim 97 has been amended to correct a typographical error to recite a "cage" carbon allotrope. Support therefore is found at page 1, lines 4-14 of the instant specification. In addition, Claim 97 has been amended to recite that

“carbon” is vaporized in the product by process claims. Support is found at Page 3, lines 27-35 of the instant specification.

These amendments to the claims do not narrow the scope thereof.

Claims 104-106 have been added to the application. Support can be found in the application. For example, the application provides ample support for fullerenes. Support thereof permeates the specification. More specifically, the specification describes three species C₆₀, C₇₀ and C₂₄₀. Each of these molecules is a fullerene. C₆₀ is fullerene-60, C₇₀ is fullerene-70 and C₂₄₀ is fullerene-240. The application refers to “new form of carbon”, (Page 1, Line 6), which defines a form of carbon other than diamond or graphite. It also describes an allotrope of carbon (e.g., see original Claim 27, and Page 16, Line 26 of the instant application), compounds made solely of carbon atoms soluble in non-polar organic solvents (see, e.g., Page 11, Lines 8-11 of the instant specification). All of these are descriptions and characterizations of and are synonymous with fullerenes. The whole thrust of the application is directed to a new form of carbon. In fact, the application is so titled. All of these delineations are different descriptions of and connote only one subject matter to one of ordinary skill in the art, viz., fullerenes.

Case law has held that compliance with the description requirement of 35 U.S.C. §112, first paragraph, requires the specification to reasonably convey to the skilled artisan that the inventor had possession at the time of the filing of the application of the claimed subject matter. Fiers v. Revel, 984 F.2d 1164, 25 USPQ 2d 1601 (Fed. Cir. 1993). As evidence thereof that a skilled artisan so understands, applicants refer to a Declaration of Harold W. Kroto, a renowned expert in the field of fullerenes, that was submitted in copending application USSN 08/236,933 and executed on June 9, 1995 (hereinafter “Kroto

Declaration I"). Attention is directed to Paragraph 15 of Kroto Declaration I wherein he states:

In my professional judgment, the above identified application adequately teaches to the skilled artisan how to make macroscopic amounts of fullerene including C₆₀ and C₇₀; furthermore, there is ample evidence in the application that Huffman and Kratschmer had in their possession macroscopic amounts of these products.

Thus, Kroto, who is a skilled artisan in the field, understood when he read the specification that the inventors had in their possession fullerenes at the time of the filing of the application.

Even the Office Action dated June 3, 1996 characterizes the product of the invention as fullerenes. Attention is directed to Page 6 of the Office Action, wherein the products of the specification are defined in terms of fullerenes:

To illustrate, the literal language of the original disclosure supports the production of fullerenes in quantities sufficient to produce coatings that are 2 microns thick. (Emphasis added).

The Office Action defines the products produced in the specification as fullerenes, indicating that even the United States Patent and Trademark Office agrees that the applicants had "fullerenes" in their possession at the time of the filing of the application and that the application has ample support under 35 U.S.C. §112, first paragraph, for said term.

Moreover, the fullerenes produced were visible. Support thereof is found throughout the specification. For example, attention is directed to Example 1 of the instant specification, wherein it is specified that the C₆₀ product produced therefrom is obtained as a powder and wherein the color of the product produced therefrom is indicated. Obviously, the isolation of a product as a powder connotes that the product could be seen with the naked eye,

i.e., it is visible. In addition, attention is directed to Page 11, line 30 of the specification, wherein it is indicated that the IR is taken of an approximately two micrometer thick C₆₀-fullerene coating on a silicon substrate. Especially since C₆₀-fullerene is colored, it is obvious that this coating can only be discernible if the material is visible. See also discussion hereinbelow regarding the support of the term “macroscopic”, the contents of which are incorporated by reference. For the reasons given herein, there is adequate support in the specification for the fullerenes to be produced to be visible.

Moreover, there is ample support for the fullerenes being a solid See Page 6, lines 20-22, Page 8, line 6, to Page 11, line 14 and Example 1 wherein it is noted that the product is a powder and can be crystallized. These characteristics denote a solid.

Thus, no new matter has been added to the application.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned “Version with markings to show changes made.”

Inasmuch as applicants have cancelled Claim 94 without prejudice, the rejection of Claims 94 and 95 under 35 U.S.C. §102(b) as allegedly being anticipated by Chatterjee is rendered moot. Withdrawal thereof is respectfully requested.

In support of the provisional rejection of Claims 89-103 under the judicially created doctrine of obviousness type double patenting in the Office Action alleges that these claims are not patentable over Claims 45-77 and 79-180 of copending application no. 07/580,246.

Since the claims in neither application has been patented, it is premature to reject the claims on this ground at this time, especially since these may not be the final

version of the claims. When one of the applications matures into a patent, then it would be more appropriate to raise the issue. Moreover, once the claims in one of the application is allowed, then applicants may consider the filing of a Terminal Disclaimer.

Thus, for the reason provided, the provisional double patenting rejection is overcome, withdrawal thereof is respectfully requested.

Pursuant to the rejection of Claims 89, 93 and 97 under 35 U.S.C. §112, first paragraph, the Office Action raises two grounds of rejection.

In the first ground, the Office Action alleges that there is no support for the limitation “caged” in Claim 97, rather the Office Action states that the application supports carbon cage. Applicants have corrected the typographical error and have amended “caged” to cage.

In the second ground of rejection, the Office Action alleges that there is no descriptive support for the term “macroscopic” in Claims 89 and 95.

Applicants disagree.

There is adequate written support for the term macroscopic, contrary to the allegations of the Office Action. To comply with the written description requirements, under 35 U.S.C. §112, first paragraph, the appellants must convey with reasonable clarity to the skilled artisan that as of the filing date he or she was in possession of the invention. Vas Cath, Inc. v. Mahurkar, 935 F2d. 1555, 1563-64 19 USPQ 2d 1111, 1117 (Fed. Cir. 1991).

There is adequate support in the application for the term “macroscopic”. More specifically, support for this term and concept permeate the specification. For example, attention is directed to Example 1 of the instant specification wherein it is specified that the C₆₀-fullerene, a representative example of fullerenes, is obtained as a powder and wherein the

color of the product produced therefrom is indicated. Obviously, the isolation of a product as a powder taken together with the fact that it is a colored powder connotes that the product could be seen with the naked eye, consistent with the use of the term macroscopic amounts recited in the claims. Furthermore, attention is directed to Page 7, Lines 10-25 of the specification, where it describes that when the sooty product was placed into a non-polar solvent, e.g., benzene, the benzene became colored and the product produced after extraction with the non-polar solvent is colored. Obviously, one cannot determine these characteristics unless it is present in amounts that can be seen with the naked eye, i.e., macroscopic amounts. For example, if less than macroscopic amounts were produced, no color would be seen. See, Curl, et al, Scientific American 1991, 54-55. In addition, attention is directed to Page 11, Line 30 of the instant specification wherein it is indicated that the IR is taken of an approximately two micrometer thick C₆₀ coating on a silicon substrate. Especially since the product is colored, it is obvious that this coating had to be seen with the naked eye. Furthermore, the application makes additional references to characteristics of the product that can only be discernible if the material is present in macroscopic amounts. For example, the application describes that the product produced by sublimation of the carbon soot can range from a uniform film to a coating, and the color is brown to gray depending on the thickness of the coat formed, while the product obtained from extraction is a dark brown to black crystalline material. Obviously, these characteristics, especially color, can be differentiated if the product was produced in amounts that can be seen with the human eye. In addition, on Page 2, Line 13, the application states that before the prior invention, no one had made C₆₀ or C₇₀ in appreciable amounts. The implication is that the present inventors were successful in achieving this goal, consistent with the teachings in the application. Appreciable by definition

means “enough to be perceived”, See Webster Unabridged Dictionary 2nd Ed. p. 91 (1983), which was submitted earlier and is part of the record. Thus, “appreciable” connotes large quantity, and is consistent with the term “macroscopic”. All of these descriptions taken together as a whole connote that the inventors had at the time of the filing of the application possession of fullerenes being produced in macroscopic amounts.

Attention is further directed to Kroto I and II Declarations already of record. In Paragraph 14 and 15 of the Kroto I Declaration, Kroto testifies that the application adequately describes the method for making macroscopic amount of fullerenes, such as C₆₀ and C₇₀, and that based upon the teachings in the application, it is his opinion that the inventors had in their possession at the time of the filing of the application macroscopic amounts of same. In addition, in Kroto Declaration II which was executed on July 27, 1995, Kroto testifies that the description in Example 1, including the product as brownish-red powder connotes that the product could be seen with the naked eye. (See Paragraph 15). Moreover, he further testifies that by following the process described in the underlying application, he inherently produces C₆₀ in amounts that could be seen with the naked eye. For example, as testified by Dr. Kroto, in Paragraph 18, utilizing the procedure of the underlying application, he had produced 1-5 grams quantities of soot. He further testifies that one kilogram of sooty carbon product produces 100 g of C₆₀, 10 g of C₇₀ and 1 gram of other fullerenes. He further testifies that the fullerenes so produced are easily visible to the naked eye. Thus, testimony by Dr. Kroto clearly establishes that the application clearly conveys to one of ordinary skill in the art that the inventors had produced fullerenes in macroscopic amounts.

Attention in this regard is also directed to the Supplemental Declaration of

Harold W. Kroto under 37 C.F.R. §1.132 which was executed on November 16, 1999 ("Kroto III Declaration"). Dr. Kroto testifies that the specification provides evidence in several instances that the inventors had produced fullerenes in macroscopic amounts. For example, he refers to Example 1, which "describes the product thereof in powder form as brownish-red. Such language connotes, in my opinion, that the product thereof could be seen with the naked eye..."

Moreover, further attention is directed to Paragraphs 15 and 17-19 which are produced in part hereinbelow.

In Paragraph 15 of Kroto Declaration III, Kroto further testifies as follows:

Moreover, based upon repetition of the process described therein, as described hereinbelow, the process as described in the above-identified application, especially in Example 1, inherently produces fullerenes, e.g., C₆₀, in amounts that could be seen with the naked eye.

Dr. Kroto further testifies in Paragraphs 17, 18 and 19 of the Declaration as follows:

17. Utilizing the procedure exactly as described in the above-identified application, I have had fullerenes, including C₆₀, prepared in macroscopic amounts on numerous occasions since 1990 to the present. More specifically, by following the procedure described in the above-identified application and vaporizing graphite rods in an atmosphere of helium, forming the carbon soot therefrom, collecting the soot and dissolving the soot in benzene, in accordance with the procedure described in the above-identified application, I and my colleagues have prepared and identified various fullerenes, including, inter alia, C₆₀, C₇₀, C₇₆, C₇₈, C₈₄ and C₈₆.

18. Moreover, by following the procedure described in the

above-identified application, and in accordance with the procedure outlined in Paragraph 17 herein, we have isolated fullerenes in macroscopic amounts, as defined herein. For example, utilizing the procedure outlined in Paragraph 17, I have found that the smoky carbon product contains 5 to 10% C₆₀ and 1% C₇₀. We routinely produce the soot in 1-5 gram quantities and routinely extract 100-500 milligram amounts batchwise. Thus, one kilogram of sooty carbon product produces, on average, 100g of C₆₀, 10g of C₇₀ and 1 gram of other fullerenes, such as those indicated hereinabove. The various fullerenes formed can and are isolated in accordance with the isolation and purification procedures described in the above-identified application, without an undue amount of experimentation. Furthermore, the various fullerenes are isolated as solids, which are easily visible to the naked eye. For example, in a typical experiment conducted according to the procedure described in the above-identified application, C₆₀ is formed in about 100 mg quantities, C₇₀ in about 10 mg quantities and the remainder in about 1 mg quantities.

19. Thus, by following the procedure described in the above-identified application, I have found that the process described therein inherently produces ... C₆₀ in macroscopic amounts. In fact, by following the procedure of Kratschmer and Huffman, outlined in the above identified application, crystalline material of fullerenes, including C₆₀, is produced which can be seen with the naked eye.

Thus, Dr. Kroto testimony clearly evidences that he read the application and that the application clearly conveys to one of ordinary skill in the art that the inventors had produced C₆₀ in macroscopic amounts.

Moreover, Dr. Kroto testifies that by following the procedure in the teachings in the above-identified application, one of ordinary skill in the art produces, inter alia, macroscopic amounts of fullerenes. In other words, Dr. Kroto testifies that fullerenes is

inherently produced in macroscopic amounts if one of ordinary skill in the art follows the teachings in the above-identified application for producing same.

Case law has held that words describing a function or property that was inherent in the specification is considered to be supported by the disclosure and supports the adequate written requirement, in accordance with 35 U.S.C. §112, first paragraph. See, In re Reynolds, 443 F.2d 384, 170 USPQ 94 (CCPA 1971). In Reynolds the question was whether words describing a function that was inherent in the claimed product could be added to the specification by amendment, or whether such description was “new matter”. The court cited with approval the holding in Technicon Instruments Corp. v. Coleman Instruments, Inc., 255 F.Supp. 630, 640-641, 150 USPQ 227, 236 (N.D. Ill. 1966), aff’d, 385 F.2d 391, 155 USPQ 369 (7th Cir. 1967), that: “By disclosing in a patent application a device that inherently performs a function, operates according to a theory, or has an advantage, a patent applicant necessarily discloses that function, theory, or advantage even though he says nothing concerning it.” In re Reynolds, 433 F.2d at 389, 170 USPQ at 98. It was concluded that the express description of the inherent property, since not “new matter”, could be added to the specification with effect as of the original filing date. Id.

Moreover, attention is directed to the Loutfy Declaration. Although Dr. Loutfy testifies on U.S.S.N. 07/580,246, the application is identical to the underlying application except for the claims. Thus, his testimony is relevant. Loutfy testifies that the application describes a process for making fullerenes, e.g., C₆₀ and C₇₀ in measurable amounts visible to the naked eye, (See Paragraph 11), i.e., macroscopic amounts. Further attention is directed to Paragraph 17 of the Loutfy Declaration which states

17. I repeated exactly the Huffman et al.
process according to the teaching described in

the subject application including example 1 using ¼ inch in diameter graphite rod, at 100 torr Helium, using 100 ampere dc current. This graphite vaporized, and the vapor was condensed on a water cooled surface. The vaporization was performed for 50 minutes using about 17 cm length of the graphite rod and produced 12 gram of soot. The fullerenes were recovered using toluene (sic) and the amount of fullerene was determined. The yield of fullerene was about 8 to 10%. Accordingly, the total recoverable fullerenes was over 1.2 grams with over 900 mg of C₆₀ and over 200 mg of C₇₀ and the remaining other fullerenes.

According to the teaching in the subject application where they vaporized a ¼" graphite rod with 1 cm length, the inventors (sic) must have produced at least about 600 mg of soot that contains admixture of at least 63 mg of fullerenes that contain at least about 50 mg of C₆₀ and at least about 10 mg of C₇₀. A 600-mg quantity of soot certainly can be seen by the naked eye, as also indicated by the inventors (sic) that "heavy block coating on collecting substrates and/or on the walls of the chamber which can be easily scraped off for the recovery step." Also, the 60 mg of fullerene certainly can be seen by the naked eye and it is measurable. Furthermore, the 45 and 10 mg of C₆₀ and C₇₀ respectively are also measurable, in today's (sic) modern laboratory facility amount as low as 0.1 mg can be measured, and can be seen by the naked eye.

The same conclusion can be reached by simply calculating the mass of the rod vaporized in Kratschmer et al. subject application, including example 1, which is easily determined from the diameter of the graphite rod they used (1/4"), the length (1 cm), and typical density of the type of graphite used for graphite vaporization (2.0 g/cc). This calculation estimates that about 633 mg of soot containing fullerenes was produced by Kratschmer et al., which is certainly

macroscopic and in agreement with the above-presented experimental data.

Moreover, if a longer graphite rod were used, the amount of C₆₀, C₇₀ and other fullerenes produced would even be greater, as shown herein above.

As testified, Dr. Loutfy, by following the procedure of the application, fullerenes were made in amounts that were visible. He testifies that when using the same process as described in Example 1 using the same diameter graphite rod but a longer rod, and performing the vaporization for over 50 minutes, he produced 1.2 g of fullerene including 900 mg of C₆₀ and 200 mg of C₇₀. Moreover, he testifies when the experiments in Example 1 of the underlying application is repeated using the same length rod as in the application, he calculates that at least 63 mg of fullerenes containing at least 50 mg C₆₀ and at least 10 mg of C₇₀ were produced, i.e., amounts that would be seen with the naked eye, would be produced.

The Loutfy Declaration comments on why the process in the underlying application produced fullerenes in macroscopic amounts. He testifies that their process produced a high density of vapor of carbon, as described on Page 4 of the subject application resulting in formation of macroscopic amounts of fullerene. Thus, the testimony of Drs. Kroto and Loutfy, along with the description in the application clearly provide adequate evidence that at the time of filing of the underlying application, the inventors had possession of macroscopic amounts of fullerenes.

Furthermore, it is well recognized in the scientific community that the process of the underlying application produces fullerenes in macroscopic amounts See Curl, et al. Scientific American October 1991, pg. 54-62, and especially pg. 54 and 55, wherein Smalley admits that Huffman and Kratschmer, using their techniques which is that which is described

in the underlying application, were the first to make amounts of fullerenes in amounts sufficient enough to see, touch or smell. Moreover, attention is directed to U.S. Patent No. 6,077,401 attached as Exhibit 2 to Loutfy Declaration, wherein it is acknowledged that the present inventors were the first to isolate macroscopic amounts of "C₆₀", i.e., a fullerene. Further, attention is directed to the press release of the Royal Swedish Academy of Sciences, copy attached, awarding the Nobel Prize to Smalley, et al. in which it identified Kratschmer and Huffman were the first to produce isolable quantities of C₆₀, a fullerene. See also videotape entitled "Molecules With Sunglasses," copy enclosed, wherein Smalley and others testify that Kratschmer and Huffman were the first to produce fullerenes in macroscopic amounts. In addition, See also, MRS Bulletin, 1994, 54 et seq., wherein the Huffman and Kratschmer, the inventors of the above-identified application, are recognized by MRS and received an award from MRS "for the discovery of a way to produce macroscopic amounts of fullerenes..." See also Europhy New 25, 1994 and the Certificate Attached, awarding Smalley, Krotto, Huffman and Kratschmer for the Discovery of New Molecular Forms of Carbon and Their Production in the Solid States, (attached hereto). As stated therein, Kratschmer and Huffman "found" that they could produce crystals of C₆₀ and C₇₀ and dissolve C₆₀ and C₇₀ in the soot produced by a carbon arc and cooled by helium.

All of this evidences that the present process produces macroscopic amounts of fullerenes and that the application conveys to the skilled artisan that the inventors had possession of making the products of the present invention, i.e., fullerenes, in macroscopic amounts.

Case law has held that the description requirement is met if the application conveys to the skilled artisan that the applicants has possession of the invention at the time of

the filing. Vas Cath Inc. v. Mahurkar, 935 F.2d 1535, 19 USPQ2d 1111 (Fed. Cir. 1995).

The testimonies by Kroto in all three Declarations and Loutfy, who are skilled artisans in the field, evidence that they understood, from reading the application, that the applicants had made macroscopic amounts of fullerenes and had it in their possession at the time of the filing of the application, providing further evidence that there is adequate support in the specification for the term "macroscopic".

The present situation is not unlike that in In re Smythe, 480 F.2d 1376, 178 USPQ 279 (CCPA 1973). In Smythe, the invention related to a "continuous automatic analysis system where discrete liquid samples...are successfully introduced into an apparatus as a continuous stream, the individual samples being separated by a segmentizing medium." Both the specification and original claims identified this medium as "air or other gas which is inert to the liquid." The applicant later added claims that described the medium as "inert fluid". The United States Patent and Trademark Office rejected the added claims on the basis of the description requirement, but the Smythe Court reversed, stating that the use of the term "inert fluid" would naturally occur to the skilled artisan reading the description of the use of air or other gas as a segmenting medium to separate the liquid samples. Id at 1384, 178 USPQ at 285. The court provided its rationale as follows:

...[W]hereas the broader concept of using "inert fluid" would naturally occur to one skilled in the art from reading appellants' description of the use and functions of the segmenting medium specifically described, we see no basis for denying appellants the claims which recite the segmenting medium broadly as "an inert fluid". The alternative places upon patent applicants, the Patent Office, and the public the undue burden of listing, in the case of applicants, reading and examining, in the case of the Patent Office, and printing and storing, in the case of the public, descriptions of the very many structural or functional equivalents of disclosed elements or steps which are already stored in the minds of those skilled in the arts, ready for instant recall upon reading the descriptions of specific elements of steps.

We are not saying that the disclosure of 'air or other gas which is inert to the liquid' sample by itself is a description of the use of all 'inert fluid' media. Rather, it is the description of the properties and functions of the 'air or other gas' segmentizing medium described in appellants' specification which would suggest to a person skilled in the art that appellants' invention includes the use of 'inert fluid' broadly...

A hypothetical situation may make our point clear. If the original specification of a patent application on the scales of justice disclosed only a 1-pound 'lead weight' as a counterbalance to determine the weight of a pound of flesh, we do not believe the applicant should be prevented, by the so-called 'description requirement' of the first paragraph of §112, or the prohibition against new matter of §132, from later claiming the counterbalance as a 'metal weight' or simply as a 1-pound 'weight', although both 'metal weight' and 'weight' would indeed be progressively broader than 'lead weight', including even such an undisclosed, but obviously art-recognized equivalent, 'weight' as a pound of feathers. The broader claim language would be permitted because the description of the use and function of the lead weight as a scale counterbalance in the whole disclosure would immediately convey to any person skilled in the scale art the knowledge that the applicant invented a scale with a 1-pound counterbalance weight, regardless of its composition. (Emphasis in original)

The Smythe Court held that the description in the application suggested to the skilled artisan the broader term. Similarly, as in Smythe, the present application supports the concept "macroscopic amounts of fullerenes". Based upon all of the evidence referred to

hereinabove, the concept of macroscopic amounts would naturally occur to the skilled artisan as testified by Kroto in Kroto Declaration I, Paragraph 15 and Loutfy Declaration, Paragraphs 15-19.

According to the Office Action, the literal language of the original disclosure supports the production of fullerene in quantities sufficient to produce coatings that are 2 microns thick. Although the specification supports the production of fullerenes in macroscopic amounts, even if the allegation in the Office Action were correct, this is an admission by the United States Patent and Trademark Office that significant amounts of fullerene were prepared. Moreover, assuming that allegation were correct, much more fullerene could be prepared, including tonnage quantities, if the process were repeated again and again. Thus, even with the Office Action's assumptions, assuming sufficient amount of carbon source were utilized, macroscopic quantities of fullerenes could be produced.

The Office Action cites In re Barker, 194 USPQ 470 (CCPA 1977); according to the Office Action, Barker contained drawings that showed contemplation of an embodiment of making prefabricated panels of wooden shingles, where the backing board had lengths of four or eight feet with a repetitive series of eight or 16 shingles per backing board. The applicants wished to amend the claims to recite a backing board having a length at least as great as the aggregate width of at least six shingles, but the Barker court held that the specification did not support such an amendment. However, the present situation is quite distinct from that of In re Barker. In Barker, there was nothing in the specification which applicants could point to which connoted the language that they wish to add to the claims. It was clear that applicants contemplated backing boards of four and eight foot lengths having a repetitive series of eight or 16 shingles thereon; and that there was no support for language that applicants wished to add.

This is unlike the present situation in which there are plenty of passages, which taken as a whole connote and support that applicants had macroscopic amounts of fullerenes at the time of filing. In addition, unlike the situation in Barker, applicants have Declaration from skilled artisans that attests to the fact that the application supports macroscopic amounts of fullerenes. Withdrawal of the rejection on the second ground is obviously requested.

Therefore, for the reasons provided the rejection of Claims 89, 93 and 97 under 35 U.S.C. §112, first paragraph is overcome; withdrawal thereof is respectfully requested.

The Office Action has rejected Claims 97, 99 and 100 under 35 U.S.C. §112, second paragraph, applicants have amended the claims as suggested in the Office Action; as amended, it is respectfully submitted that the rejection of these claims is overcome. Withdrawal thereof is respectfully requested.

Pursuant to the rejection of Claims 88, 90-92 and 94-103 under 35 U.S.C. §102(b), the Office Action cites Kroto, et al. with Curl, et al. cited to show a state of fact.

Kroto, et al. is directed to a method of making C₆₀, C₇₀ in which graphite was vaporized by laser irradiation and detected by time of flight mass spectroscopy. As stated in Curl, et al. at page 54, Kroto, et al. could not collect more than a few tons of thousands of molecules. As stated:

“This amount was plenty to detect and probe with the sophisticated techniques available in our laboratory, but there was not enough to see, touch or smell.”

Thus, it is admitted that by the techniques described in Kroto, only a few thousands of molecules were made, but it was not sufficient to see as a visible product, as claimed. Moreover, since it could not be seen, fullerenes could not be isolated as a solid product,

as claimed. Thus, the fullerenes produced by Kroto were not made in macroscopic amounts, as claimed by the present application.

However, the claims are directed to macroscopic amounts of fullerene, in one form or another. The claims recite that the fullerenes products are visible, a characteristic of macroscopic amounts. See definition of “macroscopic” in Webster’s Dictionary. In addition, the claims recite that the product is produced in sufficient amounts to be isolated as a solid. Again, the amount can only be achieved if the product were visible. Kroto, et al. do not teach, disclose or suggest fullerenes in macroscopic amounts. This fact is admitted by authors of these article in Scientific American, 1991 pp 54-63. Attention is directed to pg. 54-55, in which they admit that they never produced visible or macroscopic amounts of fullerenes.

Since the Kroto, et al. reference does not teach all of the elements of the claims, e.g., “visible product” and/or “solid” and/or macroscopic amounts, Kroto, et al. do not teach or disclose the claimed invention and thus cannot anticipate the claims of the present application. Thus, for the reasons given herein, the rejection of Claims 88, 90-91 and 94-103 under 35 U.S.C. §102(b) is obviated; withdrawal thereof is respectfully requested.

Pursuant to the rejection of claimed subject matter under 35 U.S.C. §102(b), the Office Action cites Kratschmer, et al. I.

Kratschmer, et al. I, however, do not teach, or disclose that they had in their possession fullerenes. More specifically, they noted that the products which they produced had strong absorption bands originating from matrix-isolated carbons. They identified them as C₄, C₅, C₆, C₇, C₈ and C₉. These carbon clusters are not fullerenes, as claimed by the present invention. Thus, there is no teaching in Kratschmer, et al. I that fullerenes were produced. Moreover, whatever it is they made, Kratschmer, et al. I never isolated macroscopic, i.e., visible

amounts of same as presently claimed. Further, it is not surprising that the products prepared by Kratschmer, et al. I are different from that of the present invention since the reaction conditions were different. In Kratschmer, et al. I, the vaporization was conducted at very low pressure, e.g., 5×10^{-16} Torr. This is unlike the conditions described in the present invention, wherein the conditions are such to make fullerenes in macroscopic or visible amounts or amounts sufficient to isolate as a solid. As described on Page 4, lines 1-10, under the conditions of the present invention, a high density of carbon vapor is produced, however under the conditions in Kratschmer, et al. I, at such low pressure, it was not possible to produce a high density of carbon and thus, they could not produce fullerenes.

Since the reference does not teach or disclose fullerenes either specifically or inherently, Kratschmer, et al. I do not teach or disclose fullerenes in visible amounts or in sufficient amounts to isolate as a solid, as claimed by the present invention. Consequently, the rejection of the claims under §102(b) as allegedly being anticipated by Kratschmer, et al. I is overcome; withdrawal thereof is respectfully requested.

In support of the rejection of claimed subject matter under 35 U.S.C. §102(a), the Office Action cites Kratschmer, et al. II. The reference discloses the preparation of C₆₀ in carbon soot; however, the reference never separated the C₆₀ from the soot, and isolated it. This is unlike claims in the present invention which is directed to isolated fullerenes in macroscopic amounts or in visible amounts, or in amounts sufficient to isolate a solid as claimed.

Thus, Kratschmer, et al. II do not teach or disclose the present invention; therefore this rejection is obviated, and withdrawal thereof is respectfully requested.

Moreover, applicants are submitting herewith two Kratschmer Declarations and two Huffman Declarations.

The two Kratschmer Declarations show that Fostiropoulos is not an inventor of Kratschmer, et al. II. The authors of the article are Huffman, Kratschmer and Fostiropoulos. The inventive entity of the present invention are Huffman and Kratschmer. The Kratschmer Declarations are submitted to establish that Fostiropoulos was not an inventor of the relevant subject matter in Kratschmer, et al., and thus Kratschmer, et al. II is not an invention of another and is not a proper reference pursuant to the holding in In re Katz, 687 F.2d 450, 215 USPQ 14 (CCPA 1982). Thus, Kratschmer, et al. II cannot be used as a reference to reject the claimed subject matter.

Moreover, attention is directed to the Huffman Declarations, which show that the present inventors antedated the relevant teachings in Kratschmer, et al. II.

The publication date of Kratschmer, et al. II is not known. Applicants attorney received a letter from the publisher that it does not know when the actual mailing and publication of the Kratschmer, et al. article occurred. A copy of that letter from Dr. Andrew Dempster on behalf of the publisher is attached for the Supplemental Declaration of Huffman as Exhibit 1.

As indicated in the letter, the first public release of the "Kratschmer, et al." article occurred with the dispatch of the journal issue in which the article appeared. It was published in volume 170, and the publisher indicated that July 6, 1990 is the cover date of this issue. Dr. Dempster further indicates that he does not have any records as to the actual dispatch date of this particular issue, but that in the normal course of business, it would have been dispatched to its subscribers a few days before the cover date of the issue, that is, sometime in the period July 1-6, 1990. Exhibit 1 indicates that Andrew Dempster will contact the subscription department to ascertain whether it has any records regarding the date of dispatch of this issue to its subscribers.

Attached to the Supplemental Declaration of Huffman as Exhibit 2 is the further reply from the publisher indicating that the subscription department of the publisher does not have a record of the actual dispatch date, the issue date in which the article by Kratschmer, et al. appeared.

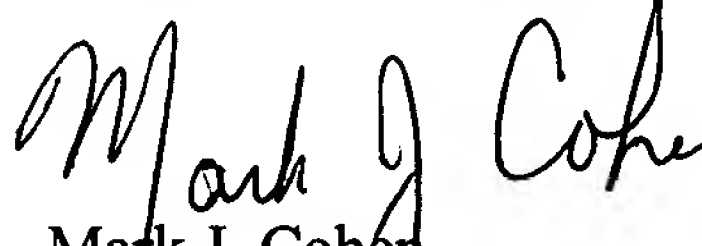
Applicants are enclosing herewith a Huffman Declaration dated May 10, 2000 and "Supplemental Declaration" dated June 23, 2000 from Donald R. Huffman in which he attests that the invention described and claimed in the above-identified application was completed in the U.S. prior to July 1, 1990, that all acts testified in the Huffman Declaration dated May 10, 2000 relating to the completion of the invention in the U.S. were performed prior to July 1, 1990 and that the laboratory records annexed as Exhibits B-I in the Huffman Declaration dated May 10, 2000 were all dated prior to July 1, 1990. Thus, Dr. Huffman testifies that the invention described and claimed in the above-identified application was completed in the U.S. prior to July 1, 1990. Thus, even if Kratschmer, et al. II were dispatched as early as July 1, 1990, it still could not be used as a reference against the above-identified application.

Inasmuch as Kratschmer, et al. I has been antedated it cannot be used as a reference. The removal of Kratschmer, et al. as a reference also obviates the rejection of the claims under 35 U.S.C. §102(a).

Therefore, for the reasons given herein this rejection of the claims under 35 U.S.C. §102(a) is obviated; withdrawal thereof is respectfully requested.

Applicants respectfully submit that the present case is in condition for allowance,
which action is earnestly solicited.

Respectfully submitted,


Mark J. Cohen
Registration No. 32,211

SCULLY, SCOTT, MURPHY & PRESSER
400 Garden City Plaza
Garden City, New York 11530
(516) 742-4343

MJC:lf
Enclosures



ATTACHMENTS TO

SUBMISSION OF AMENDMENT **AFTER FINAL REJECTION** **UNDER 37 C.F.R. §1.129(a)**

“VERSION WITH MARKINGS SHOWING CHANGES MADE”

IN THE CLAIMS

Please cancel Claim 94 without prejudice.

Please amend Claims 95, 96 97, 99 and 100 as follows:

95. (Amended) A substantially pure product of any one of Claims 89-[94] 93.

96. (Amended) A substantially pure crystalline product of any one of Claims 89-[94] 93.

97. (Amended) A cage[d] carbon allotrope consisting solely of carbon atoms that is isolated from a sooty carbon product formed from the vaporization of [elemental] carbon in the presence of an inert quenching gas as a visible product, said allotrope of carbon being neither graphite nor diamond, and said allotrope of carbon being soluble in non-polar organic solvents.

99. (Amended) A solid carbon product prepared by the process comprising:

(a) vaporizing elemental carbon in the presence of an inert quenching gas under conditions effective to provide a sooty carbon product comprising fullerene molecules;

(b) depositing the sooty carbon product on a the collecting substrate;

(c) removing the sooty carbon product comprising fullerene from the sooty carbon product;

(d) subliming the carbon product comprising fullerene from the sooty carbon product; and

(e) condensing the sublimed carbon product and recovering therefrom a solid carbon product being substantially [comprising] a fullerene.

100. (Amended) The solid carbon product of Claim 98 or 99 wherein the process further comprises [comprising]:

(f) purifying the carbon product of step (e).

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New York, New York 10020
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*Dictionary Editorial Offices
New World Dictionaries
850 Euclid Avenue
Cleveland, Ohio 44114*

Manufactured in the United States of America

10 9 8 7 6

Library of Congress Catalog Card Number: 83-42537

ISBN 0-671-41819-X

Previous editions of this book were pub-
lished by The World Publishing Company,
William Collins + World Publishing Co., Inc.
and William Collins Publishers, Inc.

PRINTED IN THE UNITED STATES OF AMERICA

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